DOCUMENT RESUME

ED 397 777   IR 017 965

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TITLE   Reflections on the Interface Design of the Perseus
              Project.
PUB DATE   96
NOTE   11p.; In: Proceedings of Selected Research and
              Development Presentations at the 1996 National
              Convention of the Association for Educational
              Communications and Technology (18th, Indianapolis,
              IN, 1996); see IR 017 960.
PUB TYPE   Reports - Descriptive (141) -- Speeches/Conference
              Papers (150)

EDRS PRICE   MF01/PC01 Plus Postage.
DESCRIPTORS   *Computer Assisted Instruction; Computer Interfaces;
              Computer Software Evaluation; Costs; Delivery
              Systems; Financial Support; Higher Education;
              *Hypermedia; *Instructional Material Evaluation;
              *Material Development
IDENTIFIERS   *Greece (Ancient); Greek Culture; Harvard University
              MA; *Interactive Systems

ABSTRACT
        This paper describes the Perseus Project, an
undertaking begun in the Classics Department of Harvard University
devoted to the creation of a massive interactive hypermedia product
on ancient Greek culture. The project is discussed in terms of its
importance; contents; funding; development; delivery systems; future
releases; costs; user acceptance and reaction; examples of the user
interface; project evaluation; and mechanical advantage. A list of
design recommendations for improving the Perseus interface is also
included. (Contains 24 references.) (AEF)

ED 397 777

Title:

Reflections on the Interface Design of The Perseus Project

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IR 017965

The Perseus Project is an undertaking begun in the Classics Department of Harvard University. It is devoted to the creation of a massive interactive hypermedia product, called "Perseus," on ancient Greek culture. According to Crane and Mylonas in their 1988 article: "The Perseus Project is developing interactive, computer-based materials on Greek Civilization. These are designed to support learners, instructors, and researchers as they explore this complex subject" (p. 25). "Perseus' main audience consists of students who are classics or archaeology majors or who are taking a course in classical civilization, and of graduate students or scholars in these fields" (Mylonas, 1992).

Perseus is in the tradition of and builds on the ideas and earlier hypertext projects of such visionaries as Vannevar Bush, Douglas Engelbart, and Theodor Nelson. The huge storage requirements of Perseus were anticipated by Bush (1945) in his seminal article "As We May Think" in Atlantic Monthly. The basic ideas of hypertext systems were expounded by Engelbart in his 1963 article entitled "A Conceptual Framework for the Augmentation of Man's Intellect." His NLS and Augment hypertext systems emphasized three ideas: "a database of nonlinear text, *view filters* which selected information from this database, and *views* which structured the display of this information for the terminal" (Conklin, 1987, p. 22). Nelson's Xanadu hypertext system hoped to incorporate all the world's literary efforts. Nelson claimed that "The evolving corpus is continually expandable without fundamental change. New links and windows can continuously add new access pathways to old material" (as cited in Conklin, 1980, p. 23).

Unlike many of its predecessors, the Perseus Project is serious attempt to move an extremely large hypertext database from theory into practice. In contrast to Xanadu, Perseus concentrates on a single subject limited by geography and time. Brown University's Intermedia delivery system, which is an outgrowth of Nelson's work, was considered for Perseus, but rejected since it could only run on expensive workstations which cost $7000 to $10,000 each (Hughes, 1988). Apple's HyperCard, introduced in 1987, appeared just in time to be adopted as the delivery system for Perseus.

Why is the Perseus Project Important?

If the goal of creating a huge database on ancient Greek culture were the only thing riding on the success or failure of the Perseus Project, then the work on this esoteric project would receive coverage in journals on the classics, but be little more than a footnote in the history of hypertext and hypermedia software. However, the potential implications of Perseus extend far beyond the study of Greek history. The literature about hypermedia and hypertext includes frequent references to the Perseus Project. In journal articles, it is commended as a model for hypermedia development. Hughes called the Perseus Project "today's most ambitious, intriguing, and promising application of computer technology to academic instruction and research in the liberal arts" (1988, p. 1). In her article about evaluating Perseus, Neuman said: "The project is innovative in its development process, its technological sophistication, its range of potential applications, and its intended outcomes" (1991, p. 239).

Gregory Crane, the Editor-in-Chief of the Perseus Project, and Elli Mylonas, Managing Editor, claimed in their 1988 article that they "are committed to making Perseus useful in as many different academic environments as possible" (p. 26). Further, they expect that "a working model of electronic publication will exert influence far beyond the realm of classical studies" (p. 26) and that they will "provide a blueprint which others can initially and subsequently improve" (p. 26).

In his article "Redefining the Book: Some Preliminary Problems" (1988b), Crane speculated that the Perseus working model might substitute for or replace traditional means of publication. Crane and Mylonas (1988) predicted that once the material is gathered, Perseus 5.0 and subsequent editions could be produced at a cost no greater than printed books. The Perseus Project was committed to producing the core data and software at a price equivalent to the cost of a regular required textbook (approximately $40 in 1988) so that it would available to individual students.

What Is the Perseus Project?

The Perseus Project is known in the literature as an interactive hypermedia product, but it is also a name used for the entire enterprise which created the product and continues to support it and plan for its future. The developers tend to call the enterprise "The Perseus Project" and the hypermedia product itself "Perseus." This paper will follow the same convention.

Contents

[Perseus] will include almost the entire surviving body of Greek Tragedy, comedy and epic; works of major historians such as Herodotus and Thucydides; and substantial portions of the massive surviving works of Plato and Aristotle. There will be color images and measured drawings of museum objects (such as sculpture and Greek vase paintings), plans and pictures of buildings and sites in Greece, and an atlas based on Landsat images. Much of the material commonly studied in courses on classical Greece will be included in the database. (Crane, 1988a, p. 51)
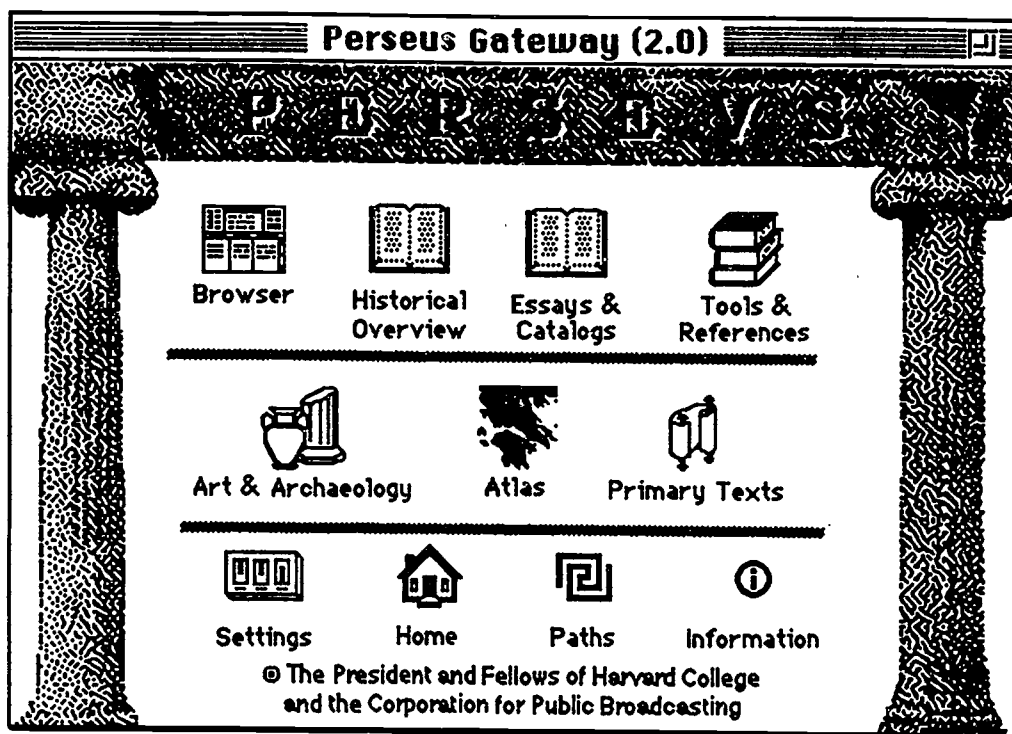
Figure 1. The Perseus Gateway

Funding

The first funding proposal for Perseus was made to the Annenberg/CPB Project in January 1986 by G. Crane, R. Grant, V.J. Harward, A. Henrichs, T. Martin, G. Nash, and D.N. Smith. Hughes (1988) claims that the funding proposal to the Annenberg/CPB Project, Apple Computer, and Harvard University dated May 24, 1988 which covered funding from January 1989 to December 1992 is for $3,390,541. "When completed, Perseus will have cost between $4 and $5 million" (Hughes, 1988, p. 3). Crane (1990) confirmed a figure of "approximately $3 million between 1987 and 1993" (p. 35). Crane and Mylonas (1988) hoped that Perseus would "become an ongoing concern and can retain its vitality long after major external funding has ceased" (p. 26).

Development

The content of Perseus was the work of a team of classicists and other specialists at Harvard and Boston Universities, and Bowdoin, Pomona, and St. Olaf Colleges. Each classicist was responsible for developing one or more of the topic areas (Crane and Mylonas, 1988). According to A.M. Lewis, a Perseus Project staff member at Harvard University, "The programming was done by several people, including Sebastian Heath, Neel Smith, and our current programmer, Jake Sisk" (e-mail communication, November 18, 1993). The instructional design process included "our Editor-in-Chief, Greg Crane, the programmers mentioned above, and many other people" (A.M. Lewis, e-mail communication, November 18, 1993). Kate Withey of Willow Design has been given credit for the "user interface to Perseus" (Crane, 1992a). Lewis gives credit for the "general shape" and "very existence" of Perseus to Crane. In fact, Lewis claimed that Crane chose the Perseus name when "Odysseus" was ruled out for having too many syllables and starting with a vowel (e-mail communication, November 22, 1993). There was no instructional designer.

Delivery System

Perseus 1.0 will run on a Macintosh LC with a hard drive. Either a CD-ROM drive is needed or a file server on a network which is able to access the CD-ROM on which Perseus is stored. A videodisc player and monitor is needed if the videodisc is to be used. The videodisc has full motion and still frame video with "short introductions to three major sanctuaries of ancient Greece: Delphi, Eleusis, and Olympia. These sequences can be played as continuous video, with a voice-over commentary on the history and archaeology of the sites" (Crane, 1992b). Still images in Perseus appear on both the CD-ROM and the videodisc.

Perseus 2.0 will be published in two editions, the Comprehensive Edition on a four CD-ROM set and the Concise Edition on a single CD-ROM.

Future Releases

The plans in 1988 called for cumulative releases of Perseus 2.0, 3.0, and 4.0 for the fall of 1990, 1991, and 1992, respectively. "Perseus 4.0 will contain between forty and one hundred megabytes of textual information (approximately forty to one hundred volumes of text, or between five and ten percent of the surviving literary material) and several thousand images" (Crane and Mylonas, 1988, p. 26). Perseus 5.0 was scheduled to be released in December, 1993 (Crane, 1990).

The User's Manual for the beta version of Perseus 2.0 announced that this version of Perseus "represents the completion of a plan, first outlined in 1985, to construct a large and heterogeneous database of materials — textual and visual — illustrating the Archaic and Classical Greek world." The future directions for the Perseus Project include producing a version of Perseus for Windows and continuing to improve Perseus site on the World Wide Web (http://www.perseus.tufts.edu). The Perseus Project followed Crane to Tufts University in 1993.
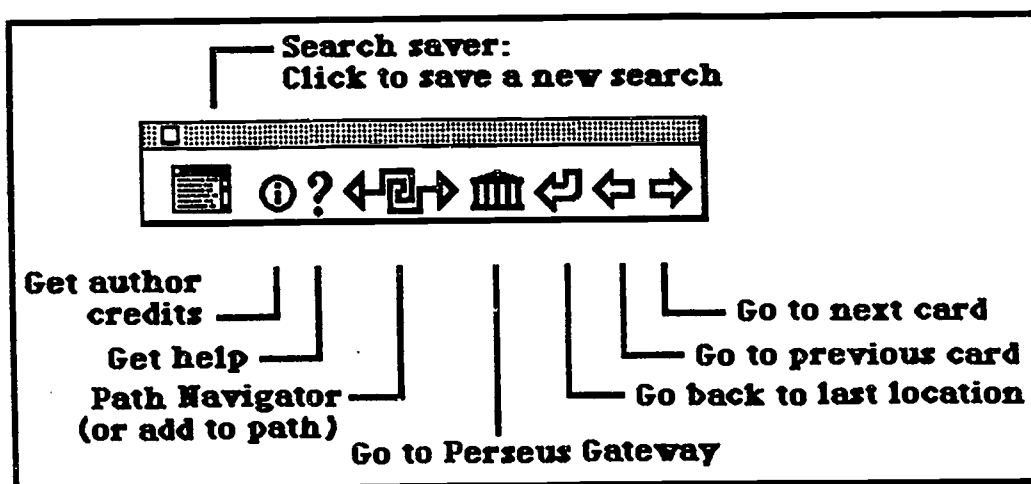

Figure 2. The Perseus Navigator in Perseus 2.0

Costs

In 1993, the entire Perseus package cost $350 ($200 for the videodisc and videodisc index, $125 for the CD-ROM, and $25 for the user's guide) according to the Perseus Order Form available from Yale University Press (YUP). The predicted price for the Comprehensive version of Perseus 2.0 with four CD-ROM set and possibly a videodisc was about $500 (e-mail communication, December 17, 1995). As recently as 1993, Crane was still hoping to move from sales to institutions to sales to individuals where the price of Perseus would be kept below $50 (Crane, e-mail communication, November 20, 1993). However, there are currently no plans to make that vision a reality.

Acceptance

The initial positive reaction to Perseus in the late 1980s in the general literature about hypertext and hypermedia was no doubt aided by descriptions of special features in Perseus. Crane and Mylonas (1988) claimed that in the first year of work that those involved in the project had "developed exercises that help the learner focus on important aspects" (p. 27) of the content, that they "used animation to illustrate the progress of a battle and the techniques of architectural drawing" (p. 27), and that they have "employed maps as an introduction to prose history" (p. 27). The Perseus Sampler, which is a pre-Beta prototype of Perseus 1.0 that reviewers like Hughes (1988) actually used to formulate their opinions of Perseus, included these three features.

These three features were all special projects developed in conjunction with the Perseus materials and their descriptions appear in the footnotes of the 1988 Crane and Mylonas article. Figures of sample screens also appear in the aforementioned article. It is surprising that none of these three features appear in Perseus 1.0 since so much space was given over to describing them in the article. Those who read the 1988 article, may have had an opportunity to examine the Perseus Sampler, and did not have a chance to examine Perseus 1.0 might erroneously assume that these three

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features were an integral part of the commercial release of Perseus and, thus, have an inflated opinion of the capabilities of Perseus.

Writing for the Bryn Mawr Classical Review, Eiteljorg, Hamilton, O'Donnell, Pearcy, and Wiltshire (1992) noted: "The task of Perseus is teaching. Arrangement of information forms part of teaching, but it is not the same as teaching. In order for teaching to happen, one human intelligence must encounter another. A student using Perseus is not likely to come away with a sense that someone has intended that he learn something." Pearcy in particular objected to the non-biased approach to this material. He said "Theirs is a neutral, liberal program allowing unguided links between miscellaneous data ... and the decision to avoid prescriptive links between data may be a weakness in Perseus." Although problems with the operation of Perseus were noted and the instructional design decisions were posed, the reviewers complemented the product profusely. Even so, Crane and unnamed others (1992c) responded at length to the negative points in the review.

Examples of the Perseus Hypermedia User Interface

Crane and Mylonas described the user interface through examples. They said if a user sees the name "Pindar," then he or she should be able to call up a description of that name. Perseus should allow students to "jump" from text using unknown geographic names to maps illustrating the location and nature of those names. Perseus should allow students to access literary references by having a window open which displays the work in question. Maps should appear in chronological sequence to show events of a period one after another. Sound should be used to convey the flavor of Greek lyric poetry or music (Crane and Mylonas, 1988).

The first part of the hypermedia design interface described above which allows non-linear access of information does appear in the current version of Perseus through a pull-down menu called "Links." The atlas is not fully implemented in Perseus 1.0 to allow for the navigation described above. Except for the voice-over commentary on the videodisc, sound is not a part of Perseus 1.0. The beta version of Perseus 2.0 has a completely redesigned atlas, but the other features mentioned above have not been implemented.

Project Evaluation

The original Perseus Project proposal included plans for evaluation and change. The Perseus Project Evaluation team believed that the characteristics of Naturalistic Inquiry (NI) make it particularly appropriate to evaluate the complex, multifaceted Perseus environment (Neuman, 1991). The interview questionnaires were open-ended. A synopsis of a student questionnaire follows:

1. How would you evaluate the overall effectiveness, attractiveness, and usefulness of Perseus?
2. How easy was it for you to navigate in Perseus?
3. How easy is it for you to learn with Perseus?
4. Do your instructors use Perseus effectively? Explain.
5. What can you suggest to improve Perseus as an instructional and/or research tool?
6. What else is important for us to know about what you think and want you do because of Perseus?

The four areas included in evaluation reports were teaching, learning, system, and content. Perhaps Neuman's most telling reaction to the evaluation was the following:

Observations and interviews suggest that one of the most significant contributions to the Perseus Project is the development of pedagogical strategies that capitalize on the hypermedia environment. Usually, these seem to arise intuitively from the staff's teaching experience and expertise rather than from the theories and procedures of systematic instructional design. Several instructors, for example, came upon the idea of using tools outside Perseus to create dynamic outlines that serve both as organizers for lectures and as vehicles for moving in and out of the Perseus databases in both planned and spontaneous ways. (p. 245)

The bottom line here was that Neuman had identified the need for improving the instructional design of Perseus. At the very least, copies of the materials developed by these instructors who used Perseus at beta test sites should be included with the purchase of Perseus 1.0 until Perseus 2.0 is released. The instructional design of subsequent releases of Perseus should be improved to respond to the problems encountered by the instructors cited above. Subsequent versions of Perseus should rely more on sound instructional design that makes the product more user friendly than on creative instructors who are willing to develop auxiliary materials to use the hypermedia aspects of Perseus effectively.

Evaluation Results

The results of a three-year evaluation of Perseus were contained in lengthy article by Marchionini and Crane (1994) in the *ACM Transactions on Information Systems*. The evaluation touched on a number of instructional design issues. However, the evaluation was summative, not formative, in nature. The changes suggested for improvement were more likely to target the learner than the product.

The evaluation effort described here involves a complex system (Perseus) based upon a new technology (hypermedia) applied to abstract goals (finding relevant information, learning how to think critically). The overall evaluation effort aims to inform general hypermedia application design, develop human-computer interaction and information-seeking behavior theories, and add to our understanding of learning and teaching. (Marchionini and Crane, 1994, p. 6)

Implicit Links

In a section called "Design Decisions," the Marchionini and Crane article explained that the philosophy that guided the creation of Perseus was "most strongly represented in the decision to use primarily use implicit rather than explicit hypermedia links" (p. 12). This was done in order to "make it possible for the user to browse the database flexibly and broadly" (p. 6). Hughes (1988) explained that an implicit link was basically a keyword approach to information retrieval where clicking on a keyword called up information in the database that was associated with that word. In Perseus, the traditional keyword notion has been extended to include such non-text objects as maps, sculpture, coins, urns, drawings, and archaeological sites. While I applaud this particular design feature of Perseus, it should be improved by providing local and/or global maps to provide the user with a sense of location.

Marchionini and Crane gave another reason for using implicit links: to create a situation where "the indexes and tools are specific to the underlying databases but not integrated with them. Thus, files containing text or graphics were distinct from the implicit links and can be managed and transported separately" (p. 13). This decision possibly made it easier to write the programming code necessary to access the database, rather than on using sound instructional design. One instructor estimated that it took him 20 to 25 hours "just to develop that one exercise because I had to eyeball all the pictures to make sure I was choosing the right one" (Marchionini and Crane, p. 27).

This aforementioned decision to use links which isolate the databases for images and storing images on the CD-ROM and videodisc means that the images take several seconds to appear. Akseyn, McCracken, and Yoder asserted in their 1988 article entitled "KMS: A Distributed Hypermedia System for Managing Knowledge in Organizations" that to be effective, hypermedia systems must execute linking with very short response times of less than one second.

Mechanical Advantage

Marchionini and Crane pointed out a salient but sometimes overlooked or unmentioned feature of such a product as Perseus. They called it the "mechanical advantage" of using Perseus to save the time normally spent time traveling to and from a library or museum, locating books or objects, turning pages, and visually scanning texts and lists for possibly relevant passages. Of course the other side of the coin is that students may not have easy access to an institutional copy of Perseus and, once they get access, the higher cognitive demands of interacting with a hypermedia product may prevent some students from accessing the necessary information and making the required connections between various databases in Perseus. Hence, there was and is a need to improve the instructional design for Perseus in order to allow users make more effective use of this "mechanical advantage" that Perseus provided. The creators of Perseus might well have had this mechanical advantage in mind because of students' complaints that studying the classics meant spending more time finding information than using it.

Classical Content

For one not versed in the arcane content of Perseus nor in the type of assignments made in the classics, the studies presented in the Marchionini and Crane evaluation article to test Perseus provide an insight into the study of the classics. There may be to be a direct connection between the information stored in Perseus and way in which the access was designed and the very nature of studying the classics. As such, since this is such a specialized body of knowledge and access design, Perseus may not be the model that works in other academic areas, as its creators had envisioned. The studies cited in the Marchionini and Crane article have been selected based on what is typically expected in studying the classics. They show that Perseus generally allows students to perform as well as and sometimes better than those students using traditional methods of access to this information. However, there is no reason to suppose that a hypermedia design that supports knowledge acquisition in Greek civilization will necessarily transfer to other academic areas where less rigid or different standards and methods of study are used.

Student Performance

The second conclusion of the Marchionini and Crane article is worthy of special attention:

> Perseus was not found to change overall student performance on traditional representations of critical thinking such as translations and essays. The mechanical advantages offered by early implementations of Perseus were not alone sufficient to produce superior translations or essays. Perseus did, however, allow some students to produce superior arguments. (p. 25)

The news for Perseus supporters was not all bad. First, students using Perseus did not do worse than those using traditional materials. In fact, they did just as well if not better. Given that library access is moving in the direction of CD-ROMs and other such interactive storage mediums, students in the future will come to Perseus better prepared to take advantage of its hypermedia storage and retrieval capacities. As for instructors, the aging professoriate will eventually be replaced by computer literate faculty who will better equipped to take advantage of Perseus in the classroom. Second, student and faculty performances will improve if the instructional design of Perseus, especially with the visual interface presented to users, is improved.

The Status of Perseus

Perseus 2.0 has not yet been released although release dates as early as December, 1993, had been promised in the past. From the introductory comments in the beta version of the Perseus 2.0 User Manual, the managers stated that Perseus has achieved the goals set out in the original conception of the project. In this author's view, the interface design of the beta version of Perseus 2.0 shows no change in the design philosophy that guided the creation of Perseus. Although the support strategies, such as a newsletter, a web site, and internet access to experts, continue to evolve, none of the basic navigation and interface design deficiencies of the Perseus 1.0 were addressed by Perseus 2.0.

Design Recommendations

The list of suggestions below is not meant to be a definitive, but it is indicative of what design considerations should be addressed in order to improve the Perseus interface.

1. **Redesign the Gateway (see Figure 1).** Call the 2-column Gateway either a temple (which is what the 5-column icon with pediment looks like on the "navigator" bar) or a library (since the gateway is really a menu repository). If the gateway is a metaphor for entering these various areas of Greek culture, a temple or library would be a better metaphor since the gateway metaphor does not imply storage. When this author encountered "dead-ends" in Perseus and used the Gateway button to extricate himself, his frustration in the sense of the gateway metaphor was heightened since he was so lost he was forced to re-enter Perseus by the main gate. To this author, returning to the temple or library where materials are stored is far less threatening.

2. **Provide local and/or global maps (browsers) so that the user has a sense of location in order to navigate more effectively.** Perseus should be ready to suggest to the disoriented user possible paths to follow from the present screen. A graphic environmental map should be provided which is based on some concept or visualization familiar to the user (Tolhurst, 1992).

3. **Use a consistent navigation interface for the various kinds of storage.** The navigation buttons are placed inconsistently at varying screen locations for various kinds of data. The interface should be consistent. The location of important text and buttons, selection methods, text fonts and styles, and window layout should be consistent in all parts of the interface (Cates, 1992; Marchionini, 1991).

4. **Have dedicated areas for frequently used functions such as navigation (see Figure 2).** Perseus should be redesigned to take advantage of the larger screens on today's computers. There is room to design a consistent user interface that does not pop up all over the screen with each new type of database and does not get covered when subsequent windows open.

5. **Use color throughout the interface.** Not only is color pleasing to the eye, it helps learners differentiate between various fields and objects at a glance. Certain functions and classifications, such as navigation and collections, could be color coded in a consistent manner.

6. **Redesign the links so that one can browse through the images using the arrow keys.** Due to the linkage design used to make the databases transportable, one cannot browse through the databases of stored images. One must painfully call each one up by name from a menu. Navigation should be simple, intuitive, and

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consistent throughout the system (Kearsley, 1988). Introduce backwards linking so that images can be easily connected to their descriptions that may have been closed or covered.

7. **Avoid screen clutter with list after overlapped list appearing on the screen.** Program Perseus for the larger monitor screens now available so that the images appear, as much as is possible, in non-overlapping positions. Since image credits are rarely used and a nuisance to deal with, offer the user an opportunity to set the system to "no credits." Since visual layout is very important, screens should be laid out so that they can be grasped perceptually (Kearsley, 1988).

8. **Cut down on the use of so many lists and menus.** If possible, create visual interfaces to allow the user to use the navigator more intuitively. Expert users should be given the ability to move through layers of menus quickly (Marchionini, 1991). Add keyboard shortcuts for frequently used menu items to save time.

9. **Give the choices in menu lists more interesting or descriptive names.** A list such as vase 1, vase 2, vase 3 or poem 1, poem 2, poem 3, etc. gives the user no clue as to what they are choosing. Users might have complete access to "jump" anywhere they like in Perseus, but these lists provide no guidance as to where to jump. Thus, time is wasted, and frustration may be the result.

10. **Design the screen more effectively to indicate the hierarchical nature of the menus that appear.** Reprogram so that images of objects, sites, and menus pop onto the screen in a more consistent manner. Given the larger screen, a column or row of icons might be used (like the toolbar in the latest versions of Microsoft Word) in order to replace the lengthy "Links" and "Perseus" pull-down menus.

Suggested Interface Design

What follows is a suggested interface design for the main screen that would take the place of the Perseus Gateway (Figure 1). This design takes into account many of the recommendations made above. The most significant improvement is that the navigation controls now present in the Perseus Gateway do not disappear when a user begins to use the program. There is no longer a need to return to the Gateway controls when a "deadend" is encountered since these controls are omnipresent.
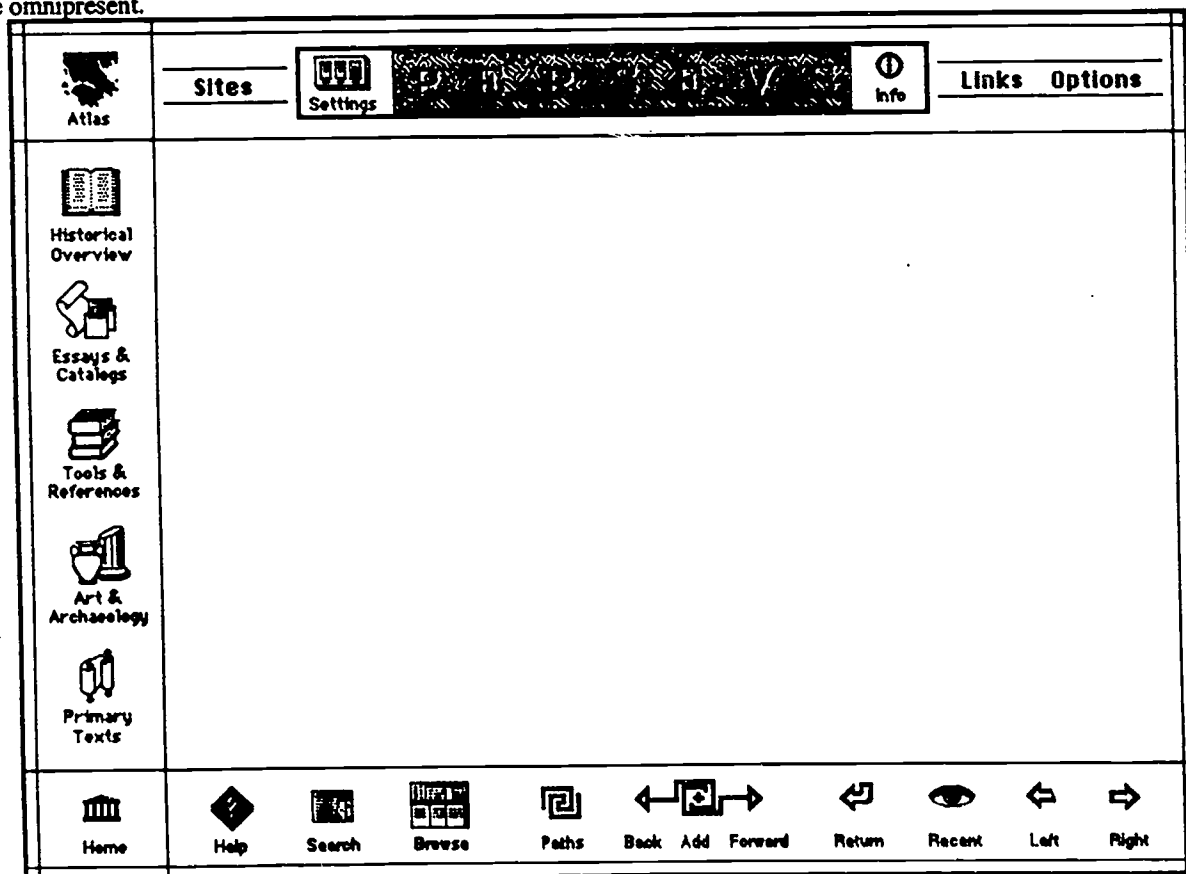

Figure 3. Suggested Interface Design to Replace the Perseus Gateway

The HyperCard menu selections have been deleted along the top of the screen, but the three pull-down menus (Sites, Links, and Options) dedicated to Perseus activities have been retained. The nebulous "Perseus" pull-down menu name has been replaced by "Options." Since the "Temple" icon on the Perseus Navigator (Figure 2) is no longer needed to return to the Gateway, that icon has now been used to "Go Home" in place of the modern bungalow that appears so out of place architecturally speaking in Perseus 1.0 and the beta version of Perseus 2.0. The infrequently used "Settings" and "Info" icons have been given less prominence in this design.

The icons for the major categories in the database that previous appeared in the center of the Gateway now appear down the left-hand side of the screen in a dedicated area that is always available. For clarity, the icon for "Essays & Catalogs" has been changed to a different icon than the one for "Historical Review." The use of the same icon for both classifications in Perseus 1.0 and the beta version of Perseus 2.0 could be confusing and may lead even an experienced user to click on the wrong one. The Atlas icon now appears next to the pull-down menu used to support its usage.

All the navigation tools and devices that allow the user to move through the database are located together across the bottom of the screen and available at all times. Names have been added to the buttons that previously appeared in the Perseus Navigator in an unnamed form. The Perseus "Footprint," the double-ended arrow icon with the maze in the middle, has been lengthed and lebeled so that users will be reminded of its three-fold functionality. The "plus sign" in the center reinforces the notion that one can "add" stops on a pathway by clicking on it.

The "Recent" button with its "eye" icon permits the user to view the last forty-two screens used in HyperCard. For those unfamiliar with this HyperCard feature, a user need only click on the thumb-nail version of a previously visited screen for the application to jump to that screen. The reason for this addition to the navigation is that the link structure in Perseus does not premit the "Return" button with its "curved arrow" icon to work properly. The Perseus 1.0 and beta version of Perseus 2.0 User's Manuals recognize that fact and suggest that users use the pull-down manu in HyperCard to access the "Recent" command when they find they are at a deadend because the "Return" button does not work. The repeated use of the Return button often leads to infinite loops where the same screens appear again and again. The Recent button allows the user to break the cycle in order to continue working in the database at a point before the impasse occurred.

Conclusion

A larger consideration than the hypermedia design suggestions listed above is the fact that the beta version of Perseus 2.0 has not made any significant instructional design changes from Perseus 1.0. Rather than expecting learners to adapt to the eccentricities of Perseus design, the design of Perseus should have adapted to the needs of learners. More people need to be allowed or encouraged to become involved. Instructional design experts need to be consulted to contribute their expertise. Given the advantage of heavy funding, Perseus will not be challenged in the near future. However, the chosen direction of the Perseus was to get bigger, not better. Except for the atlas, instead of improving the interface design, they kept what they had and added more features. The goal of attracting students to buy their own copies of Perseus will not be achieved by retaining an interface design that is cumbersome to use.

As for the Perseus Project being used as model for other academic areas, its application in that direction is limited by two problems: (1) the fact that only one version of Perseus has appeared in seven years, and (2) the price of Perseus. Relative to problem (1), the CDI (Compact Disc Interactive) product currently being offered by Phillips (that included a *Compton's Pictured Encyclopedia* on CD-ROM for $500 total) should make it clear that commercial vendors are not going to sit back and wait for the members of academe to decide how to design informational products. Manufacturers will simplify produce and sell what they can as quickly and economically as they can. When the dust clears, the best sellers (the market place) will have determined what many will consider to be the best design characteristics for hypertext and hypermedia systems.

Relative to problem (2), all the faculty members who teach calculus at my institution received complimentary copies of a CD-ROM with an entire calculus book stored on it. The point is that vendors are willing to give away CD-ROMs on mathematics to induce faculty members to adopt their materials. Compare that to the current $150 price tag on the Perseus 1.0 CD-ROM with user's guide or $350 for the entire package which includes the videodisc. Some innovative marketing ideas should be used to get the Perseus Project moving again after its promising start over seven years ago.

Before Perseus can achieve the status of being a design model for other subjects, Perseus must first incorporate design changes to make the product more user friendly by being more visually interesting while maintaining a consistent screen design. The navigational problems alone make this design impractical for most learners except for the most motivated who will learn in spite of the instructional materials used. At this stage in its development, Perseus is an adequate model for esoteric academic areas where its "mechanical advantage" to access encyclopedic information databases

can be exploited. However, Perseus 1.0 and the beta version of Perseus 2.0 do not exhibit any special design characteristics that would make it a clear choice over other products which are currently being developed for mainstream instructional applications.

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